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forms. The original grain in each case is indicated by a darker or dotted shading, while the outgrowth is shown as a less colored portion. It will be seen at a glance that there was seemingly no "method in their madness." Some germinate from the side, others from the end, while others still send out tubes from both side and end. In some cases the remnant of the pollen grain is like a shell that is found upon the back of a snail, while the irregular growth of short tubes resembles the living portion of the snail. In some instances the pollen grain looked as if it had undergone a process similar to that of the popping open of a grain of corn. In others there was an amœba-like mass, projecting from one side of the grain, having not less than a dozen arms extending in as many directions. In one case there is shown a grain with a broad zigzag extending band, as if the point of growth had changed alternately from right to left as the tube increased in length. It is doubtless true that the projecting pollen tube in each of the abnormal cases met with more than usual resistance and the place of growth was shifted to another part of the tube. In this way, by the increase in size taking place at points of least resistance, each pollen grain built up a structure peculiar to itself, determined by its surroundings. It is not entirely unlike the formation of irregular, lifeless structures when liquids undergo solidification or even crystallization under unfavorable circumstances.

These unfortunate *Uvularia* pollen grains teach us of the persistency that is inherent in these highly vitalized cells. After successive failures to develop long tubes they still boldly attempted to send out new ones until they perished victims of adverse environments.—BYRON D. HALSTED

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## EDITORIAL.

IN THE SUBJECT of botany this seems to be an era of text-books and laboratory guides. Never before have so many authors essayed to satisfy the demands of the student and teacher, and never before have students and teachers looked so eagerly for some book to suit their needs. The harvest of books is large, but the quality is of all grades. The publication of worthless botanical text-books is often deprecated, but it is not a serious evil, except to the publishers. No text-book in these days can be otherwise than short-lived which does not "fill the want" it proposes to, and in no other department is the working of the law of natural selection more apparent than in that of text-books. There is a class of botanists who are never satisfied until they write a book. With no disposition to add something to the sum of botanical knowledge by patient work (they call it lack of opportunity), they conceive that the easiest thing to do is to grind over the knowledge of others and make a text-book. If there is anything that requires complete mastery of the subject of botany, a keen and critical judgment, a happy method of thought and expression, it is to write a text-book that will live. The young worker begins by readjusting clas-

sification, and the young writer by preparing a text-book, both of which attempts require the most mature judgment backed by the fullest experience. And so we must continue to have a perennial supply of these attempts: some will do good, none will do serious harm; and any of them may serve to introduce a working botanist whose subsequent performance will atone for the crudity of his first appearance. The day of the well-nigh universal use of any text-book is probably past, for there is such a diversity of opinion concerning methods of presentation that there must needs be text-books equally diverse. Besides, text-books are becoming more and more books of reference for library rather than classroom use. However, the high schools, and colleges of equal rank in botanical equipment, are clamoring for a text-book, or rather the botanists are telling them that they need one. Several attempts have been made to supply this demand, but the failures may be grouped under four heads: (1). Some have attempted too much, apparently lacking the power of judicious omission, and the book is so bulky and technical that the untrained teacher (and they are mostly untrained in the high schools) will never attempt it but once. The authors of these books have kept an eye on the criticism of fellow botanists rather than the need of high school classes, and have feared if they omitted anything they might be accused of not knowing it. We fear that the hypercriticism indulged in by some of our leading scientific journals has developed this spirit. For it is their custom to pass over the whole well-constructed bulk of the book to condemn some little detail which more than likely holds no relation to the general purpose. (2). Others have gone to the opposite extreme, and having young pupils constantly in mind, have endeavored to attract and simplify at the expense of accuracy, a method that should be heartily condemned. (3). A third class of books, worse than either of the former, are those that treat the science of botany as a vocabulary of scientific terms. A full and illustrated glossary is not a botanical text-book, and the attempt to use it as such is to bring discredit upon botany. (4). A lack in all our recent text-books, which is against a long life, is the lack of a manual for the determination of plants. Modern methods may claim that we do not want to "analyze" plants, but we do and we always will, and it will remain the chief means of exciting a living interest in the subject of botany. Hence that modern text-book only can be a permanent success which combines with it a manual, and a manual is no easy thing to prepare. When a book can be prepared technically accurate and full enough for scientific botanists, elementary enough for beginners, perfectly easy for untrained teachers to use, suggestive enough for the experienced worker, large enough to contain all the science of botany and a manual, small enough to be completed in a term of twelve weeks and sell for a dollar or two, then will every one commend it as the book to "fill a felt want;" but the man who can accomplish this must be one who speaks "as never man spoke."